The polytable package
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Abstract
This package implements a variant of tabular/tabbing-like environments where columns can be given a name and entries can flexibly be placed between arbitrary columns. Complex alignment-based layouts, for example for program code, are possible.

1 Introduction
This package implements a variant of tabular-like environments. We will call these environments the poly-environments to distinguish them from the standard ones as provided by the \LaTeX{} kernel or the array package.

Other than in standard tables, each column has a name. For instance, the commands\column{foo}{l}\column{bar}{r} – when used within a poly-environment – define a column with name foo that is left-aligned, and a column with name bar that is right-aligned.

Once a couple of columns have been defined, the text is specified in a series of fromto commands. Instead of specifying text per column in order, separating columns with &, we give the name of the column where the content should start, and the name of the column before which the content should stop. To typeset the text “I’m aligned!” in the column foo, we could thus use the command fromto{foo}{bar}{I’m aligned}

Several fromto-commands can be used to typeset a complete line of the table. A new line can be started with \.

The strength of this approach is that it implicitly handles cases where different lines have different alignment properties. Not all column names have to occur in all lines.

2 A complete example
Figure 1 is an example that is designed to show the capabilities of this package. In particular, it is not supposed to look beautiful.
Figure 1: Example table

The example table consists of four lines. All lines have some text on the left and on the right, but the middle part follows two different patterns: the first and the third line have three middle columnss that should be aligned, the second and the fourth line have two (right-aligned) middle columns that should be aligned, but otherwise independent of the three middle columns in the other lines.

Vertical bars are used to clarify where one column ends and the next column starts in a particular line. Note that the first and the third line are completely aligned. Likewise, the second and the fourth line are. However, the fact that the bar after the text “middle 1/2” ends up between the two bars delimiting the column with “second of three” in it is just determined by the length of the text “first of two middle columns” in the last line. This text fragment is wider than the first of the three middle columns, but not wider than the first two of the three middle columns.

Let’s have a look at the input for the example table:

\begin{ptboxed}
  \defaultcolumn{l|}
  \column{.}{|l|}
  \> left
  \=3 first of three \> second of three \> third of three
  \=r right \\n
  \defaultcolumn{r|}\> left \=2 middle 1/2 \> middle 2/2 \=r right \\n  \> left \=3 middle 1/3 \> middle 2/3 \> middle 3/3 \=r right \\n  \> left
  \=2 first of two middle columns \> second of two middle columns
  \=r right \\n\end{ptboxed}

First, columns are declared, including the vertical lines. Note that there is a final column end being declared that is only used as the end column in the \fromto statements. A future version of this package will probably get rid of the need to define such a column. After the column definitions, the lines are typeset by a series of \fromto commands, separated by \. Note that the first and third column do not use m12, m22. Similarly, the second and fourth column do not use m13, m23, and m33.

So far, one could achieve the same with an ordinary \tabular environment. The table would have 6 columns. One left and right, the other four for the middle: the first and third line would use the first of the four columns, then place the second entry in a \multicolumn of length 2, and then use the fourth column.
for the third entry. Likewise, the other lines would place both their entries in a \multicolumn of length 2. In fact, this procedure is very similar to the way the \ptabular environment is implemented.

The problem is, though, that we need the information that the first of the two middle columns ends somewhere in the middle of the second of the three columns, as observed above. If we slightly modify the texts to be displayed in the middle columns, this situation changes. Figure 2 shows two variants of the example table. The input is the same, only that the texts contained in some columns have slightly changed. As you can see, the separator between the first and second middle column in the second and fourth lines of the tables now once ends up within the first, once within the third of the three middle columns of the other lines.

<table>
<thead>
<tr>
<th>left</th>
<th>first of three</th>
<th>second of three</th>
<th>third of three</th>
<th>right</th>
</tr>
</thead>
<tbody>
<tr>
<td>left</td>
<td>middle 1/2</td>
<td></td>
<td>middle 2/2</td>
<td>right</td>
</tr>
<tr>
<td>left</td>
<td>middle 1/3</td>
<td>middle 2/3</td>
<td>middle 3/3</td>
<td>right</td>
</tr>
<tr>
<td>left</td>
<td>first of two</td>
<td></td>
<td>second of two</td>
<td>right</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>left</th>
<th>first of three</th>
<th>second of three</th>
<th>third of three</th>
<th>right</th>
</tr>
</thead>
<tbody>
<tr>
<td>left</td>
<td>middle 1/2</td>
<td>middle 1/3</td>
<td>middle 2/2</td>
<td>right</td>
</tr>
<tr>
<td>left</td>
<td>middle 1/3</td>
<td>middle 2/3</td>
<td>middle 3/3</td>
<td>right</td>
</tr>
<tr>
<td>left</td>
<td>the first of two middle columns</td>
<td></td>
<td>2/2</td>
<td>right</td>
</tr>
</tbody>
</table>

Figure 2: Variants of the example table

If one wants the general case using the \multicolumn approach, one thus has to measure the widths of the entries of the columns to compute their relative position. In essence, this is what the package does for you.

3 Haskell code example

I have written this package mainly for one purpose: to be able to beautifully align Haskell source code. Haskell is a functional programming language where definitions are often grouped into several declarations. I’ve seen programmers exhibit symmetric structures in different lines by adding spaces in their source code files in such a way that corresponding parts in different definitions line up. On the other hand, as Haskell allows user-defined infix operators, some programmers like their symbols to be typeset as \LaTeX symbols, not as typewriter code. But using \LaTeX symbols and a beautiful proportional font usually destroys the carefully crafted layout and alignment.

With lhs2TeX, there is now a preprocessor available that preserves the source code’s internal alignment by mapping the output onto \polytable’s environments. Figure 3 is an example of how the output of lhs2TeX might look like.

Of course, this could be useful for other programming languages as well. In fact, lhs2TeX can be tweaked to process several experimental languages that are based on Haskell, but I can imagine that this package could generally prove useful to typeset program code.
class (Eq a) ⇒ Ord a where

\[
\begin{align*}
\text{compare} & :: a \rightarrow a \rightarrow \text{Ordering} \\
(\langle), (\leq), (\geq), (\rangle) & :: a \rightarrow a \rightarrow \text{Bool} \\
\text{max}, \text{min} & :: a \rightarrow a \rightarrow \text{Bool}
\end{align*}
\]

— Minimal complete definition: (\leq) or compare
— using compare can be more efficient for complex types
\[
\begin{align*}
\text{compare } x \, y \mid x \equiv y & = \text{EQ} \\
\mid x \leq y & = \text{LT} \\
\mid \text{otherwise} & = \text{GT}
\end{align*}
\]
\[
\begin{align*}
x \leq y & = \text{compare } x \, y \neq \text{GT} \\
x \langle y & = \text{compare } x \, y \equiv \text{LT} \\
x \geq y & = \text{compare } x \, y \neq \text{LT} \\
x \rangle y & = \text{compare } x \, y \equiv \text{GT}
\end{align*}
\]
\[
\begin{align*}
\text{max } x \, y \mid x \leq y & = y \\
\mid \text{otherwise} & = x
\end{align*}
\]
\[
\begin{align*}
\text{min } x \, y \mid x \leq y & = x \\
\mid \text{otherwise} & = y
\end{align*}
\]

Figure 3: Haskell code example

4 Other applications

Although I have written this package for a specific purpose, I am very much interested to hear of other potential application areas. Please tell me if you found a use for this package and do not hesitate to ask for additional features that could convince you to use the package for something.

5 The lazylist package

Internally, this package makes use of Alan Jeffrey’s excellent lazylist package, which provides an implementation of the lambda calculus using fully expandable control sequences. Unfortunately, lazylist.sty is not included in most common \TeX{} distributions, so you might need to fetch it from CTAN separately.

6 Reference

6.1 Setup

New in v0.8: We allow to implicitly define columns by just using the names during table content specification, without having declared them formally using \texttt{\textbackslash column} (see below).

\texttt{\textbackslash nodefaultcolumn} By default, though, this behaviour is turned off, because the use of a mis-
spelled column is often an error. Thus, by default or after the command `\nodefaultcolumn` is used, all columns must be declared.

Using a statement of the form `\defaultcolumn{⟨spec⟩}`, implicit columns can be activated. All undefined columns that are encountered will be assumed to have format string ⟨spec⟩.

### 6.2 The environments

New in v0.8: There are now five environments that this package provides: in addition to the former `ptabular`, `parray`, and `pboxed`, there is now also `ptboxed` and `pmboxed`. The environment `pboxed` typesets the material in boxes of the calculated length, but in normal paragraph mode. The advantage is that there can be page breaks within the table. Note that you should start a new (probably non-indented) paragraph before beginning a `pboxed`. All lines that a `pboxed` produces are of equal length, so it should be possible to center or right-align the material.

Both `ptboxed` and `pmboxed` are like `pboxed`, but pre-wrapped in a `tabular` or `array` environment, respectively, and thus not page-breakable but less fragile (or should I just say: easier to use) than the unwrapped `pboxed`. With those, there is no need for `ptabular` and `parray` anymore – which were directly based on (and translated into) usual `tabular` and `array` environments as provided by the `array` package. The environments are still supported, to ensure compatibility, but they are mapped to `ptboxed` and `pmboxed`, respectively.

The `pmboxed` and `parray` environments assume math mode, whereas `ptboxed` and `ptabular` assume text mode. The `pboxed` environment works in both text and math modes and adapts to whatever is currently active.

I wrote in previous versions that one additional environment, namely `plongtable`, a poly-version of the `longtable` environment, was planned. Page-breaking of `pboxed` works fine, and I do not see a real need for a `plongtable` environment anymore. If you would like it anyway, feel free to mail me and inform me about the advantages it would have over `pboxed`.

The interface is the same for all of the environments.

### 6.3 The interface

*(Note: this has changed significantly in v0.8!)*

In each of the environments, the following commands can be used. All other commands should be used with care if placed directly inside such an environment: the contents of a polytable are processed multiple times; hence, if your commands generate output, the output will end up multiple times in the final document, and destroy your layout.

With `\column{⟨dimen⟩}{⟨columnid⟩}{⟨spec⟩}`, a new column ⟨columnid⟩ is specified. The name of the column can be any sequence of alphanumerical characters. The ⟨spec⟩ is a format string for that particular column, and it can contain the same constructs that can be used in format strings of normal tables or arrays. However, it must only contain the description for one column.
As long as the save/restore feature (explained below) is not used, \texttt{column} definitions are local to one table. One can define a column multiple times within one table: a warning will be produced, and the second format string will be used for the complete table.

Columns must be defined before use when implicit columns using \texttt{defaultcolumn} are disabled.

A minimal horizontal position \texttt{⟨dimen⟩} (relative to the beginning of the table) can be specified for a column, which defaults to 0pt.

\texttt{\textbar=} \texttt{⟨fromid⟩}\{⟨spec⟩\} instructs the package to prepare for a new entry starting at column \texttt{⟨fromid⟩}. Everything that follows the command, up to the next interface-command (except \texttt{column}) or the end of the environment is interpreted as contents of the entry and can be arbitrary \LaTeX{} code that has balanced grouping. The column specifier \texttt{⟨spec⟩} can be used to define a different formatting for this particular entry. If the specifier starts with an exclamation mark (!), it will be used as specifier for all entries of that column. The use of multiple exclamation-mark specifiers for the same column name gives precedence to the last one, but you should not rely on this behaviour as it may change in the future.

Note that, contrary to normal \LaTeX{} behaviour, the second argument is the optional argument. Therefore, if an entry starts with an opening bracket ([), and the optional argument is omitted, a \texttt{relax} should be inserted between command and opening bracket, as otherwise the entry would be treated as the optional argument.

\texttt{\textbar> \texttt{⟨fromid⟩}\{⟨spec⟩\}} is a variant of \texttt{\textbar=} where both arguments are optional. If no column name is given then the current column name, postfixed by a dot (.), is assumed as column name. At the beginning of a line, a single dot (.) will be assumed as a name. The \texttt{⟨spec⟩} argument has the same behaviour as for \texttt{\textbar=}.

Note that if the specifier is given, the column name must be given as well, but may be left empty if the default choice is desired. For instance, \texttt{\textbar> [] [r]}, will move to the next column, which will be typeset right-aligned.

\texttt{\textbar< \texttt{⟨fromid⟩}} ends the current entry at the boundary specified by \texttt{⟨fromid⟩}. This macro can be used instead of \texttt{\textbar>} or \texttt{\textbar=} if an entry should be ended without immediately starting a new one. Differences in behaviour occur if \texttt{⟨fromid⟩} is associated with a non-trivial column format string. TODO: Improve this explanation.

\texttt{\textbackslash fropto{⟨fromid⟩}{⟨toid⟩}{⟨text⟩}} will typeset \texttt{⟨text⟩} in the current line, starting at column \texttt{⟨fromid⟩} and ending before column \texttt{⟨toid⟩}, using the format string specified for \texttt{⟨fromid⟩}.

A line of a table usually consists of multiple \texttt{\textbackslash fropto} statements. Each statement’s starting column should be either the same as the end column of the previous statement, or it will be assumed that the start column is located somewhere to the right of the previous end column. The user is responsible to not introduce cycles in the (partial) order of columns. If such a cycle is specified, the current algorithm will loop, causing a dimension too large error ultimately. TODO: catch this error.

\texttt{\textbackslash \} (or, now deprecated, \texttt{\textbackslash nextline}) ends one line and begins
the next. There is no need to end the last line. One can pass an optional argument, as in \(\texttt{(dimen)}\), that will add \(\texttt{(dimen)}\) extra space between the lines.

### 6.4 A warning

The contents of the table are processed multiple times because the widths of the entries are measured. Global assignments that modify registers and similar things can thus result in unexpected behaviour. New in v0.7: \LaTeX{} counters (i.e., counters defined by \texttt{\newcounter}) are protected now. They will be reset after each of the trial runs.

### 6.5 Saving column width information

Sometimes, one might want to reuse not only the same column, but exactly the same alignment as in a previous table. An example would be a fragment of program code, which has been broken into several pieces, with documentation paragraphs added in between.

With \texttt{\savecolumns\[\texttt{(setid)}\]}, one can save the information of the current table for later reuse. The name \texttt{setid} can be an arbitrary sequence of alphanumeric characters. It does \textit{not} share the same namespace as the column names. The argument is optional; if it is omitted, a default name is assumed. Later, one can restore the information (multiple times, if needed) in other tables, by issuing a \texttt{\restorecolumns\[\texttt{(setid)}\]}.

This feature requires to pass information backwards in the general case, as column widths in later environments using one specific column set might influence the layout of earlier environments. Therefore, information is written into the \texttt{.aux} file, and sometimes, a warning is given that a rerun is needed. Multiple reruns might be required to get all the widths right.

I have tried very hard to avoid producing rerun warnings infinitely except if there are really cyclic dependencies between columns. Still, if it happens or something seems to be broken, it often is a good idea to remove the \texttt{.aux} file and start over. Be sure to report it as a bug, though.

Figure 4 is an example of the Haskell code example with several comments inserted. The source of this file shows how to typeset the example.

### 7 The Code

```latex
\begin{verbatim}
1 (*package*)
2 \NeedsTeXFormat{LaTeX2e}
3 \ProvidesPackage{polytable}[]
4 [2020/07/14 v0.8.6 'polytable' package (Andres Loeh)]
\end{verbatim}
```

New in v0.7.2: The \texttt{amsmath} package clashes with \texttt{lazystylist}: both define the command \texttt{And}. Although it would certainly be better to find another name in \texttt{lazystylist}, we take precautions for now. (Note that this will still fail if \texttt{lazystylist} is already loaded — but then it’s not our problem . . .

7
We introduce a new type class `Ord` for objects that admit an ordering. It is based on the `Eq` class:

```
class (Eq a) ⇒ Ord a where
```

The next three lines give the type signatures for all the methods of the class.

```
compare :: a → a → Ordering
(<), (≤), (≥), (>) :: a → a → Bool
max, min :: a → a → Bool
```

— Minimal complete definition: (≤) or `compare`
— using `compare` can be more efficient for complex types

As the comment above says, it is sufficient to define either (≤) or `compare` to get a complete instance. All of the class methods have default definitions. First, we can define `compare` in terms of (≤).

The result type of `compare` is an `Ordering`, a type consisting of only three values: `EQ` for “equality”, `LT` for “less than”, and `GT` for “greater than”.

```
compare x y | x ≡ y = EQ
| x ≤ y = LT
| otherwise = GT
```

All the other comparison operators can be defined in terms of `compare`:

```
x ≤ y = compare x y ≠ GT 
x < y = compare x y ≡ LT 
x ≥ y = compare x y ≠ LT 
x > y = compare x y ≡ GT 
```

Finally, there are default definitions for `max` and `min` in terms of (≤).

```
max x y | x ≤ y = y
| otherwise = x 
min x y | x ≤ y = x 
| otherwise = y 
```

Figure 4: Commented Haskell code example
The option debug will cause (a considerable amount of) debugging output to be printed. The option info is a compromise, printing some status information for each table, but no real debugging information. The option silent, on the other hand, will prevent certain warnings from being printed.

First, we declare a couple of registers that we will need later.

In \PT@allcols, we will store the list of all columns, as a list as provided by the lazylist package. We initialise it to the empty list, which is represented by \Nil.

These are flags and truth values. TODO: Reduce and simplify.

The macro \PT@defaultcolumnspec contains, if defined, the current default specifier that is assumed for undefined columns. The other two commands can be used to set the specifier.

These macros steer where the end-column queue is stored, which can be either in memory or on disk.
memory or on disk. The default is on disk, because that’s more reliable for large
tables. There is a package option memory to make \texttt{memorytables} the default.

```latex
\newcommand{\memorytables}{%
  \let\PT@preparewrite\@gobble
  \let\PT@add\PT@addmem
  \let\PT@prepareread\PT@preparereadmem
  \let\PT@split\PT@splitmem
  \let\PT@finalize\relax
%}
\newcommand{\disktables}{%
  \let\PT@preparewrite\PT@preparewritefile
  \let\PT@add\PT@addfile
  \let\PT@prepareread\PT@preparereadfile
  \let\PT@split\PT@splitfile
  \let\PT@finalize\PT@finalizefile
%}
\DeclareOption{memory}{\AtEndOfPackage{\memorytables}}
\ProcessOptions
```

Similar to the \texttt{tabularx} package, we add macros to print debugging information to
the log. Depending on package options, we can set or unset them.

```latex
\newcommand*{\PT@debug}{
  \def\PT@debug@ ##1{\typeout{(polytable) ##1}}
}
\newcommand*{\PT@info}{
  \def\PT@typeout@ ##1{\typeout{(polytable) ##1}}
}
\let\PT@debug@\@gobble
\let\PT@typeout@\@gobble
\def\PT@warning{\PackageWarning{polytable}}%
\def\PT@silent{\let\PT@typeout@\@gobble\let\PT@warning\@gobble}
```

The first is (almost) stolen from the \texttt{tabularx}-package, to nicely align dimensions
in the log file. TODO: fix some issues. The other command is for column names.

```latex
\def\PT@aligndim#1#2#3\@@{%
  \ifnum#1=0
    \if #2p%
      \PT@aligndim@0.0pt\space\space\space\space\space\space\space\@@
    \else
      \PT@aligndim@#1#2#3\space\space\space\space\space\space\space\space\space\@@
    \fi
  \else
    \PT@aligndim@#1#2#3\space\space\space\space\space\space\space\space\space\space\@@
  \fi}
```

```latex
\def\PT@aligndim@#1.#2#3#4#5#6#7#8#9\@@{%
  \ifnum#1=1\#1\#2\#3\#4\#5\#6\#7\#8\#9\@@
  \ifnum#1<10 \space\fi
  \ifnum#1<100 \space\fi
  \ifnum#1<1\circ\space\fi
```

10
\def\PT@rerun\{\PT@typeout@{We have to rerun LaTeX ...}\
\AtEndDocument\{\PackageWarning{polytable}\
{Column widths have changed. Rerun LaTeX.\@gobbletwo}}\
\global\let\PT@rerun\relax\}

Both macros are used during typesetting to store the current column. The differences are subtle. TODO: remove one of the two, if possible. The \PT@currentcol variant contains the internal name, whereas the \PT@currentcolumn variant contains the external name.

### 7.1 Macro definition tools

\def\PT@listopmacro #1#2#3\{ #1 #3 to the list #2 \}
\def\PT@consmacro\PT@listopmacro\Cons
\def\PT@appendmacro\PT@listopmacro\Cat

The following macro can be used to add something to the end of a control structure.

\def\PT@gaddendmacro #1#2\{ add #2 to the end of #1 \}

\def\PT@expanded\{\PT@expanded\{#1\}(\PT@expanded\{#2\})\}

This macro expands its second argument once before passing it to the first argument. It is like \expandafter, but works on grouped arguments instead of tokens.
\PT@enamedef This is much like \@namedef, but it expands #2 once.
106 \def\PT@enamedef #1\% sets name #1 to the expansion of #2
107 {\PT@expanded{\@namedef{#1}}}

\PT@addoptargtomacro
\PT@addargtomacro
109 \def\PT@addoptargtomacro
110 {\PT@add@argtomacro\PT@makeoptarg}
111 \def\PT@addargtomacro
112 {\PT@add@argtomacro\PT@makearg}
113 \def\PT@add@argtomacro#1#2#3\%
114 {\PT@expanded{\PT@expanded{\gdef\PT@temp}}{\csname #3\endcsname}}\%
115 #1\%
116 \PT@expanded{\PT@gaddendmacro{#2}}{\PT@temp}
117
118 \def\PT@makeoptarg\%
119 \def\PT@makearg\%
120 \def\PT@expanded{\PT@temp}{\expandafter\PT@temp}
121 \def\PT@gaddendmacro{#2}
122
\PT@gobbleoptional Gobbles one optional argument. Ignores spaces.
123 \newcommand*{\PT@gobbleoptional}[1][\empty]{\ignorespaces}
124 \PT@gobbleoptional The following macros handle a simple queue of names. With \PT@addmem, a
name is added to the end of the queue. Using \PT@splitmem, the first element
of the queue is bound to another command. As a replacement, we also define
\PT@addfile and \PT@splitfile, that implement the queue in a file.
125 \def\PT@addmem#1#2{\PT@gaddendmacro #2{\PT@elt{#1}}}
126 \def\PT@splitmem#1#2{#1\PT@nil{#2}{#1}}
127 \def\PT@elt#1#2\PT@nil#3#4{\gdef #3{#1}\gdef #4{#2}}
128 \def\PT@queuefilename{\jobname.ptb}
129
130 \def\PT@addfile#1#2{\immediate\write #2{\string\def\string\PTtemp{#1}\string\empty}}
131 \def\PT@splitfile#1#2{\ifeof #1\%
132 \let #2=\empty
133 \else
134 \read #1 to#2\%
135 \% show #2\%
136 \% #2 hack, because it essentially ignores #2
137 \PT@expanded{\def #2}{\PTtemp}\%
138 \% show #2\%
139 \fi\}
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\begin{polynomial}
This macro starts the environment. It should, however, not be called directly, but rather in a LATEX environment. We initialize the token register to the empty string and then start scanning.

\begin{environment}{\beginpoly}
We save the current enclosing LATEX environment in \PT@environment. This will be the \texttt{\end} we will be looking for, and this will be the environment we manually close in the end.

\begin{environment}{\endpoly}
This is just defined for convenience.

\begin{environment}{\endpoly}
Whenever an \texttt{\end} is encountered, we check if it really ends the current environment. We store the tokens we have read. Once we have found the end of the environment, we initialize the column queue and column reference, \PT@columnqueue and \PT@columnreference. The new interface commands build the queue during

7.2 The environment

The general idea is to first scan the contents of the environment and store them in a token register. In a few test runs, the positions of the column borders are determined. After that, the table is typeset by producing boxes of appropriate size.

the first test run, containing the end columns of specific entries of the table. Later, 
the queue is copied to be the reference, and in the typesetting run, the information 
is used to compute the correct box widths. We start with an empty queue, and 
set the reference to \texttt{undefined}, because it is not yet needed. TODO: queue and 
reference must be global variables at the moment; try to change that.

\begin{verbatim}
\newcommand{\PT@scantoend}% LaTeX check
\long\def{\PT@scantoend #1\end #2}{
{\PT@toks\expandafter{\the\PT@toks #1}}
\def{\PT@temp{#2}}
\ifx{\PT@temp{\PT@environment}
{\global{\let}{\PT@columnqueue}{\empty}}
{\global{\let}{\PT@columnreference}{\undefined}}
{\PT@preparewrite}{\PT@columnqueue}
{\expandafter}\PT@getwidths
\else
{\PT@toks\expandafter{\the\PT@toks\end{#2}}}\expandafter{\PT@scantoend}
\fi}
\PT@getwidths Here, we make as many test runs as are necessary to determine the correct column 
widths.
\end{verbatim}

We let the \texttt{\getwidths} command initialize a column in the first run.

\begin{verbatim}
\let{\column}{\PT@firstrun@column}
\end{verbatim}

There is the possibility to save or restore columns. This is new in v0.4.

\begin{verbatim}
\let{\savecolumns}{\PT@savewidths}
\let{\restorecolumns}{\PT@restorewidths}
\end{verbatim}

We always define a pseudo-column \texttt{@begin@}. This denotes the begin of a row. We 
also define a pseudo-column \texttt{@end@} denoting the end of a row (as of v0.8; and I'm 
not sure if \texttt{@begin@} is still needed).

\begin{verbatim}
\column{@begin@}{@{}l@{}}
\column{@end@}{}
\PT@cols=0\relax
\end{verbatim}

The two other commands that are allowed inside of the environment, namely 
\texttt{\fromto} and \texttt{\\} are initialized. The \texttt{\fromto} command may increase the current 
widths of some columns, if necessary, whereas \texttt{\\} just resets the counter that keeps 
track of the “current” column, to 0. The command \texttt{\newline} is an old name for 
\texttt{\\}.

\begin{verbatim}
\let{\fromto}{\PT@fromto}
\let{\PT@processentry}{\PT@checkwidth}
\let{\PT@scanbegin}{\PT@scanbeginfree}
\let{\PT@resetcolum}{\\}
\let{\PT@resetcolumn}{\PT@fromopt}
\let{\PT@toopt}{\newline}
\end{verbatim}

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Now we are ready for a test run.

After the first run, we print extra information. We use the contents of the macro \texttt{\textbackslash column} to check whether we are in the first run, because it will be reset below for all other runs to do nothing.

The columns are initialized after the first run. Therefore, we make sure that the \texttt{\textbackslash column} command won’t do much in the other runs. Also, saving and restoring columns is no longer needed.

Note that redefining just \texttt{\textbackslash column} or just \texttt{\textbackslash PT@firstrun\textbackslash column} is not enough. In the former case, on the next trial run, \texttt{\textbackslash PT@getwidths} will restore the old definition. In the latter case, if there is no additional trial run, the typesetting run will be performed with the wrong definition. TODO: I think similar issues exist with saving/restoring?

\begin{verbatim}
\global\PT@changedfalse % nothing has changed so far
\PT@resetcolumn % we are at the beginning of a line
\the\PT@toks
@ifundefined{PT@scanning}{\PT@resetcolumn\relax}%
\ifsx{column}\PT@otherrun\textbackslash column
  \else
    \% we are in first run, print extra info
    \PT@prelazylist
    \PT@typeout@{{\texttt{\textbackslash column: }\the\PT@cols\space columns, %}
    \PT@Print\PT@allcols}%
    \PT@postlazylist
  \fi
\let\column \PT@otherrun\textbackslash column
\let\PT@firstrun\textbackslash column \PT@otherrun\textbackslash column
\let\savecolumns \PT@gobbleoptional
\let\restorecolumns \PT@gobbleoptional
\let\PT@savewidths \PT@gobbleoptional
\let\PT@restorewidths \PT@gobbleoptional
\PT@restorecounters
\if\PT@changed
  \% we need to rerun if something has changed
  \expandafter\PT@getwidths
\else
  \% we are done and can do the sorting
  \expandafter\PT@sortcols
\fi
\end{verbatim}
Save all \LaTeX\ counters so that they can be restored after a trial run.

\def\PT@savecounters{egingroup
  \def\@elt ##1\%
  \global\csname c@##1\endcsname\the\csname c@##1\endcsname\%
  \xdef\PT@restorecounters{\cl@@ckpt}\%\xdef\PT@restorecounters{\cl@@ckpt}\%
  \endgroup}

The column borders are sorted by their horizontal position on the page (width). The they get numbered consecutively. After that, we are well prepared to typeset the table.

First, we sort the list. To make sure that the computation is only executed once, we save the sorted list by means of an \edef. Sorting happens with lazylist's \Insertsort which expects an order and a list. As order, we provide \PT@ltwidth, which compares the widths of the columns. To prevent expansion of the list structure, given by \Cons and \Nil, we fold the list with the \noexpand versions of the list constructors.

Now, each column is assigned a number, starting from zero.

Now is a good time to save table information, if needed later. We will also compare our computed information with the restored maximum widths.

Finally, we can typeset the table.

We redefine \fromto and \\ to their final meaning in the typesetting process. The \fromto statements will be replaced by appropriate calls to \multicolumn, whereas the the \\ will again reset the counter for the current column, but also call
the table environment’s newline macro. Again, \texttt{\nextline} is allowed as an old name for \texttt{\}`.\par

256 \texttt{\def\PT@typeset}
257 \texttt{\{}\texttt{\PT@typeout\{}\texttt{Typesetting the table ...\}}%\texttt{\}}
258 \texttt{\let\PT@processentry \PT@placeinbox}
259 \texttt{\let\PT@scanbegin \PT@scanbeginwidth}
260 \texttt{\let\\= \PT@resetandcr}
261 \texttt{\let\nextline \PT@resetandcr}
262 \texttt{\PT@prepareread\PT@columnreference\PT@columnqueue}

The environment that will be opened soon, can, if if happens to be \texttt{tabular} or \texttt{array}, redefines \texttt{\}} once more, and will redefine it to \texttt{\@arraycr}. To prevent this, we also set \texttt{\@arraycr} to our command.

263 \texttt{\let\@arraycr \PT@resetandcr}

The array environments keep each line in a group; therefore \texttt{\PT@resetcolumn}, when executed during the linebreak, will not affect the current column counters. By having \texttt{\PT@resetcolumn} before entering the environment, we ensure that the group reset will have the correct effect anyway.

264 \texttt{\PT@resetcolumn \% we are at the beginning of a line}

Now we start the tabular environment with the computed preamble. We redefine the \texttt{\}} to whatever the environment dictates.

265 \texttt{\PT@begin\%}

Run, and this time, typeset, the contents.

266 \texttt{\the\PT@toks}
267 \texttt{\PT@fill\% new in 0.7.3: balance the last line}

End the array, close the group, close the environment. We are done!

268 \texttt{\PT@finalize\% finalize the queue (possibly close file)}
269 \texttt{\PT@end}
270 \texttt{\endgroup}
271 \texttt{\PT@typeout\{}\texttt{Finished.\}}%\texttt{\}}
272 \texttt{\expandafter\end\expandafter{\PT@environment}}%

\textbf{7.3 New interface}

From v0.8 on, we offer a more convenient user interface for the programming of the columns.

\texttt{\PT@from} \texttt{\PT@fromopt} \texttt{\PT@toopt} The macro \texttt{\PT@from} is bound to \texttt{=} in a polytable environment, and used to move to the named column specified by its argument. The previous column is closed. The variant \texttt{\PT@fromopt} is bound to \texttt{>} and takes an optional argument instead of a mandatory, which defaults to the current column name followed by a single dot .. We use an empty default which is then redefined to make it easier for the user to use the default definition (TODO: explain better). Otherwise, it is like \texttt{\PT@from}.  

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The macro \texttt{\textbackslash PT@toopt} is bound to \textbackslash <. Where \texttt{\textbackslash PT@from} ends an entry if one is active, and starts a new one, the \texttt{\textbackslash PT@toopt} variant only ends the currently active entry.

\begin{verbatim}
273 \newcommand{\PT@from}[1]{}\% 274 {\PT@checkendentry{#1}\PT@dofrom{#1}} 275 \newcommand{\PT@fromopt}[1][]{}\% 276 {\def\PT@temp{#1}\% 277  \ifx\PT@temp\empty\% 278     \def\PT@temp{\PT@currentcolumn .}\% 279          \fi\% 280     \PT@expanded\PT@from\PT@temp}\% 281 \newcommand{\PT@toopt}[1][]{}\% 282 {\def\PT@temp{#1}\% 283  \ifx\PT@temp\empty\% 284     \def\PT@temp{\PT@currentcolumn .}\% 285          \fi\% 286     \PT@expanded\PT@toopt\PT@from\PT@temp}\% 287 \end{verbatim}

\texttt{\textbackslash PT@from}

\begin{verbatim}
292 \newcommand{\PT@dofrom}[1]{}\% 293 {\edef\PT@currentcolumn{#1}\% 294 \let\PT@scanning\PT@currentcolumn\% 295 \let\PT@currentpreamble\relax% necessary for prepare\% 296  \ifnextchar[\%\]{\PT@expanded\PT@dofrom{#1}}\% 297 \newcommand{\PT@dospecfrom}{}% LaTeX check 298 \def\PT@dospecfrom #1[#2]\% 299 {\PT@checkglobalfrom #2\PT@nil{#1} 300      \PT@dofrom{#1}}\% 301 \newcommand{\PT@checkglobalfrom}{}% LaTeX check 302 \def\PT@checkglobalfrom!#1\PT@nil#2\% 303 {\column{#2}{#1}}\% 304 \newcommand{\PT@getglobalfrom}{}% LaTeX check 305 \def\PT@getglobalfrom!#1\PT@nil#2\% 306 {\column{#2}{#1}}\% 307 \newcommand{\PT@ignorefrom}{}% LaTeX check 308 \def\PT@ignorefrom #1\PT@nil#2\% 309 {\def\PT@currentpreamble{#1}}\% 310 \end{verbatim}

\texttt{\textbackslash PT@dofrom}
Here, \texttt{\PT@scanbegin} will scan free or using the width, depending on the run we are in.

\texttt{\PT@fromto} This is the implementation for the old explicit \texttt{\fromto} macro. It takes the start and end columns, and the contents. It can be used for all runs.

We allow a \texttt{\fromto} to follow a new-style command, but we reset the current column to undefined, so no text may immediately follow a \texttt{\fromto} command.

We check a switch to prevent nested \texttt{\fromtos}.

Here, the real work is done:

The commands \texttt{\PT@scanbegin} and \texttt{\PT@processentry} will perform different tasks depending on which run we are in.

We ignore spaces after the \texttt{\fromto} command.

\texttt{\PT@checkendentry} This macro checks if we are currently scanning an entry. If so (this is detected by checking if \texttt{\PT@scanning} is defined), we close the entry and handle it (in \texttt{\PT@endentry}) before returning. The argument is the name of the column from which this macro is called.
7.4 The trial runs

For each column, we store information in macros that are based on the column name. We store a column’s type (i.e., its contribution to the table’s preamble), its current width (i.e., its the horizontal position where the column will start on the page), and later, its number, which will be used for the \multicolumn calculations.

During the first trial run, we initialise all the columns. We store their type, as declared in the \column command inside the environment, and we set their initial width to 0pt. Furthermore, we add the column to the list of all available columns, increase the column counter, and tell \TeX to ignore spaces that might follow the \column command. New in v0.4.1: We make a case distinction on an empty type field to prevent warnings for columns that have been defined via \PT@setmaxwidth – see there for additional comments. New in v0.4.2: We allow redefinition of width if explicitly specified, i.e., not equal to 0pt.
For the case that we are saving and there is not yet information from the .aux file, we define the .max and .trusted fields if they are undefined. If information becomes available later, it will overwrite these definitions.

\@ifundefined{PT@col@#2.max}{}{%
\@namedef{PT@col@#2.max}{#1}{}
}\fi
\expandafter\let\csname PT@col@#2.trusted\endcsname\PT@true}

\PT@otherrun@column
In all but the first trial run, we do not need any additional information about the columns any more, so we just gobble the two arguments, but still ignore spaces.
\newcommand\PT@otherrun@column[3][0]{}\ignorespaces}
\PT@checkcoldefined
This macro verifies that a certain column is defined and produces an error message if it is not. New in v0.8: this macro implicitly defines the column if we have a default column specifier.
\def\PT@checkcoldefined #1{}\@ifundefined{PT@col@#1.type}{}{%
\@ifundefined{PT@defaultcolumnspec}{
\PackageError{polytable}{Undefined column #1}{}%}{
\PT@debug@{Implicitly defining column #1}{}
}\PT@expanded{\column{#1}}{\PT@defaultcolumnspec}}%\fi}
We also have to define columns with empty specifiers. This situation can occur if save/restoring columns that are defined by default specifiers.
\expandafter\ifx\csname PT@col@#1.type\endcsname\empty\relax
\@ifundefined{PT@defaultcolumnspec}{}{%
\PT@debug@{Implicitly defining column #1}{}
\PT@expanded{\column{#1}}{\PT@defaultcolumnspec}}%\fi}
\PT@checkwidth
Most of the work during the trial runs is done here. We increase the widths of certain columns, if necessary. Note that there are two conditions that have to hold if \fromto{A}{B} is encountered:

- the width of A has to be at least the width of the current (i.e., previous) column.
the width of $B$ has to be at least the width of $A$, plus the width of the entry.

Here, we check the first condition.

```latex
\def\PT@checkwidth #1#2% first column should have been checked before
\PT@checkcoldefined(#2)% first column should have been checked before
\def\PT@temp{PT@col@#1}%
\ifx\PT@currentcol\PT@temp
\PT@debug@{No need to skip columns.}%
\else
\PT@colwidth=\expandafter\@nameuse\expandafter
{\PT@currentcol.width}\relax
\ifdim\PT@colwidth>\csname PT@col@#1.width\endcsname\relax
\PT@debug@{s \PT@aligncol{#1}: %
old=\expandafter\expandafter\expandafter
\PT@aligndim\csname PT@col@#1.width\endcsname\@@%
new=\expandafter\PT@aligndim\the\PT@colwidth\@@}%
\PT@changedtrue
\PT@enamedef{PT@col@#1.width}{\the\PT@colwidth}%
\fi
\fi
The same for the untrusted .max values.
\PT@colwidth=\expandafter\@nameuse\expandafter
{\PT@currentcol.max}\relax
\ifdim\PT@colwidth>\csname PT@col@#1.max\endcsname\relax
\PT@debug@{S \PT@aligncol{#1}: %
old=\expandafter\expandafter\expandafter
\PT@aligndim\csname PT@col@#1.max\endcsname\@@%
new=\expandafter\PT@aligndim\the\PT@colwidth\@@}%
\PT@changedtrue
\PT@checkrerun
\PT@enamedef{PT@col@#1.max}{\the\PT@colwidth}%
\fi
We assume that the current field is typeset in \@curfield; we can thus measure
the width of the box and then test the second condition.
```
\PT@expanded{\def\PT@temp{\the\wd\@curfield}%
\global\PT@colwidth=\expandafter\@nameuse\expandafter
{\PT@col@#1.width}%
\global\advance\PT@colwidth by \PT@temp\relax%
\ifdim\PT@colwidth>\csname PT@col@#1#2.width\endcsname\relax
\PT@debug@{#2 (width \PT@temp) starts after #1 (at \csname PT@col@#1#1.width\endcsname)}
\fi
\fi
```
\PT@debug@c \PT@aligncol{#2}: %
old=expandafter\expandafter\expandafter\PT@aligndim\csname PT@col@#2.width\endcsname@@%
\PT@changedtrue
\PT@enamedef{PT@col@#2.width}{\the\PT@colwidth}%
\fi
And again, we have to do the same for the untrusted maximums.
\global\PT@colwidth=\@nameuse{PT@col@#1.max}%
\global\advance\PT@colwidth by \PT@temp\relax%
\ifdim\PT@colwidth>\csname PT@col@#2.max\endcsname\relax
% we need to change the width
\PT@debug@c \PT@aligncol{#2}: %
old=expandafter\expandafter\expandafter\PT@aligndim\csname PT@col@#2.max\endcsname@@%
\PT@changedtrue
\PT@checkrerun
\PT@enamedef{PT@col@#2.max}{\the\PT@colwidth}%
\fi
\ifnum\csname PT@col@#2.trusted\endcsname=\PT@false\relax
\ifdim\PT@colwidth=\csname PT@col@#2.max\endcsname\relax
\PT@debug@c \PT@aligncol{#2}: the\PT@colwidth\space is now trusted%
\expandafter\let\csname PT@col@#2.trusted\endcsname\PT@true%
\fi
\fi
\fi
Finally, we update the current column to #2.
\def\PT@currentcol{PT@col@#2}
\PT@checkrerun
If we have changed something with the trusted widths, we have to check whether
we are in a situation where we are using previously defined columns. If so, we
have to rerun LATEX.
\def\PT@checkrerun{\ifnum\PT@inrestore=\PT@true\relax
\PT@rerun
\fi}
\PT@resetcolumn
If the end of a line is encountered, we stop scanning the current entry, and reset
the current column.
\newcommand*{\PT@resetcolumn}[1][]%
\{\PT@checkendentry{#1}\%
\let\PT@currentcolumn=\empty%
\let\PT@scanning=\undefined%
\let\PT@nullcol=\PT@nullcol%
\%
\PT@scanbeginfree
% TODO: remove these lines if they don’t work
%\let\PT@pre@preamble=\empty
%\PT@scanbeginfree
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The name of the @begin@ column as a macro, to be able to compare to it with \ifx; dito for the @end@ column.

\def\PTnullcol{PT@col@@begin@}
\def\PTendcol{PT@col@@end@}

### 7.5 Sorting and numbering the columns

Not much needs to be done here, all the work is done by the macros supplied by the \texttt{lazylist} package. We just provide a few additional commands to facilitate their use.

\texttt{\PTexecute}\texttt{\PTSequence}\texttt{\PTshowcolumn}\texttt{\PTprint}\texttt{\PTTeXif}

\textbf{\PTexecute} With \texttt{\PTexecute}, a list of commands (with sideeffects) can be executed in sequence. Usually, first a command will be mapped over a list, and then the resulting list will be executed.

\def\PTexecute{\Foldr\PTSequence\empty}
\def\PTSequence #1#2{#1#2}

\textbf{\PTshowcolumn} This is a debugging macro, that is used to output the list of columns in a pretty way. The columns internally get prefixes to their names, to prevent name conflicts with normal commands. In the debug output, we gobble this prefix again.

\def\PTshowcolumn #1#2\PTshowcolumn@{#1{#2} }
\def\PTshowcolumn@ PTcol@#1\PTshowcolumn@{#1}
\def\PTshowcolumnwidth #1\PTtypeout@{\PTshowcolumn\PTaligncol{#1}:\expandafter\expandafter\expandafter\PTaligndim\csname #1.max\endcsname\@@}}
\def\PTstripcolumn #1\expandafter\PTstripcolumn@#1\PTstripcolumn@{#1}
\def\PTstripcolumn@ PTcol@#1\PTstripcolumn@{#1}{\fi #1}

\textbf{\PTprint} Prints a list of columns, using \texttt{\PTshowcolumn}.

\def\PTprint#1{\PTexecute{\Map{\PTshowcolumn\Identity}#1}}
\def\PTprintwidth#1{\PTexecute{\Map{\PTshowcolumnwidth\Identity}#1}}

\textbf{\PTTeXif} This is an improved version of \texttt{lazylist}'s \TeXif. It does have an additional \texttt{\relax} to terminate the condition. The \texttt{\relax} is gobbled again to keep it fully expandable.

\def\PTTeXif #1\PTgobblefalse\else\relax\gobbletrue\fi #1#2\PTgobbletrue\fi #1{\fi #1}
The order by which the columns are sorted is given by the order on their (untrusted) widths.

517 \def\PT@ltmax #1#2\
518 {\Not{\PT@TeXif{\ifdim\csname #1.max\endcsname>\csname #2.max\endcsname}}}\

This assigns the next consecutive number to a column. We also reassign \PT@lastcol to remember the final column.

519 \def\PT@numbercol #1\
520 %\PT@typeout@{numbering #1 as \the\PT@cols}\
521 \PT@enamedef{#1.num}{\the\PT@cols}\
522 \def\PT@lastcol{#1}\
523 \advance\PT@cols by 1\relax

7.6 Typesetting the table

Remember that there are three important macros that occur in the body of the polytable: \texttt{\column}, \texttt{\fromto}, and \texttt{\}. The \texttt{\column} macro is only really used in the very first trial run, so there is nothing new we have to do here, but the other two have to be redefined.

\PT@resetandcr This is what \texttt{\} does in the typesetting phase. It resets the current column, but it also calls the surrounding environment’s newline macro \texttt{\PT@cr} ... If we are not in the last column, we insert an implicit \texttt{\fromto}. This is needed for the boxed environment to make each column equally wide. Otherwise, if the boxed environment is typeset in a centered way, things will go wrong.

524 \newcommand{\PT@resetandcr}\
525 {\PT@expanded\PT@checkendentry\PT@lastcol%\
526 \iffx\PT@currentcol\PT@nullcol\
527 \else\
528 \iffx\PT@currentcol\PT@nullcol\
529 \def\PT@currentcol{\Head{\Tail{\PT@sortedlist}}}\
530 \fi\
531 \def\PT@currentcol{\PT@StripColumn{\PT@currentcol}}\
532 \PT@typeout{\text{adding implicit fromto at eol from }\PT@currentcol%\
533 \text{space to }\PT@lastcol%\
534 \PT@expanded{\PT@expanded{\fromto{\PT@currentcol}}{\PT@lastcol}}\
535 \fi\
536 \PT@typeout{\text{Next line ...}}\
537 \let\PT@scanning\undefined% needed for resetcolumn\
538 \PT@resetcolumn\PT@cr}

\PT@fill This variant of \texttt{\PT@resetandcr} is used at the end of the environment, to insert a blank box for the \texttt{boxed} environment to balance the widths of all lines. It does not start a new line, and does nothing if the current column is \texttt{\begin}. TODO: extract commonalities with \texttt{\PT@resetandcr} into a separate macro.

539 \newcommand{\PT@fill}\
540 {\PT@expanded\PT@checkendentry\PT@lastcol%\
541 \iffx\PT@currentcol\PT@nullcol
\texttt{\textbackslash PT@placeinbox} This macro is the final-run replacement for \texttt{\textbackslash PT@checkwidth}. We use the pre-computed width information to typeset the contents of the table in aligned boxes. The arguments are the same as for \texttt{\textbackslash PT@checkwidth}, i.e., the start and the end columns, and the assumption that the entry is contained in the box \texttt{@curfield}.

\texttt{\textbackslash def\textbackslash PT@placeinbox\#1\#2\%}

We start by computing the amount of whitespace that must be inserted before the entry begins. We then insert that amount of space.

\texttt{\textbackslash def\textbackslash PT@preparescan\%}

The important part is to use the pre-typeset box \texttt{@curfield}. This produces real output!

\texttt{\textbackslash def\textbackslash PT@currentcol\#2\%}

Finally, we have to reset the current column and ignore spaces.

\texttt{\textbackslash PT@preparescan} The macro \texttt{\textbackslash PT@preparescan} sets the two macros \texttt{\textbackslash PT@scanbegin} and \texttt{\textbackslash PT@scanend} in such a way that they scan the input between those two macros and place it in a box. The width of the box is determined from the given column names. The name \texttt{@end} can be used as a column name is a free scan (a scan without knowing the real end column) is desired. To allow redefinition of the preamble, we assume that \texttt{\textbackslash PT@currentpreamble} is defined to \texttt{\relax} if we want it set normally during \texttt{\textbackslash PT@preparescan}. 

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First, we check that both columns are defined. This will actually define the columns if implicit column definitions are enabled.

\begin{macrocode}
{\PT@checkcoldefined{#1} \PT@checkcoldefined{#2} \PT@colwidth=\@nameuse{PT@col@#2.max} \advance\PT@colwidth by -\@nameuse{PT@col@#1.max}\relax \ifmmode \PT@debug@{*math mode*} \let\dollarbegin=$\$ \let\dollarend=$\$ \let\col@sep=\arraycolsep \else \PT@debug@{*text mode*} \let\dollarbegin=\begingroup \let\dollarend=\endgroup \let\col@sep=\tabcolsep \fi \ifx\PT@currentpreamble\relax \PT@expanded{\PT@expanded{\def\PT@currentpreamble}} \fi \expandafter\PT@splitpreamble\@preamble\@sharp\PT@nil}
\end{macrocode}

Now, we make a preamble using the macro \texttt{\@mkpream} from the \texttt{array} package. This macro takes a format string as argument, and defines \texttt{\@preamble} as a result, where \texttt{\@sharp} occurs in the positions of the column contents. We perform the operation in a group to prevent certain redefinitions from escaping. The \texttt{\@preamble} is set globally anyway.

\begin{macrocode}
{\PT@expanded\@mkpream\PT@currentpreamble \@addtopreamble\@empty \let\CT@row@color\relax% colortbl compatibility}
\end{macrocode}

We split the preamble at the position of the \texttt{\@sharp}, using some tricks to make sure that there really is precisely one occurrence of \texttt{\@sharp} in the resulting preamble code, and producing an error otherwise. The splitting defines \texttt{\PT@pre@preamble} and \texttt{\PT@post@preamble}. With those and the computed \texttt{\PT@colwidth}, the scan is successfully prepared.

\begin{macrocode}
\expandafter\PT@splitpreamble\@preamble\@sharp\PT@nil}
\end{macrocode}

We now define the splitting of the preamble.

\begin{macrocode}
\def\PT@splitpreamble #1\@sharp #2\PT@nil{% \let\@sharp=\relax% needed for the following assignment \def\PT@terp[#2]{% \ifx\PT@terp\empty% \PackageError{polytable}{Illegal preamble (no columns)}{}% \fi \PT@splitpreamble\#1\#2\PT@nil}}
\end{macrocode}
Finally, we can define the scan environment, which depends on all the other macros being defined correctly. The macro \emph{\PT@scanbegin} is not defined directly, but will be set to \emph{\PT@scanbeginfree} during the trial runs and to \emph{\PT@scanbeginwidth} during the final run.

\begin{verbatim}
\def\PT@scanbeginwidth\{\PT@scanbegin@{\hbox to \PT@colwidth}}
\def\PT@scanbeginfree\{\PT@scanbegin@{\hbox}}
\def\PT@scanbegin@#1\{\setbox\@curfield #1\bgroup\PT@pre@preamble\strut\ignorespaces\}
\def\PT@scanend\{\PT@post@preamble\egroup\}
\end{verbatim}

7.7 Saving and restoring column widths

Column width information can be saved under a name and thus be reused in other tables. The idea is that the command \emph{\savecolumns} can be issued inside a polytable to save the current column information, and \emph{\restorecolumns} can be used to make that information accessible in a later table. All tables using the same information should have the same column widths, which means that some information might need to be passed back. Therefore, we need to write to an auxiliary file. Both \emph{\savecolumns} and \emph{\restorecolumns} are mapped to the internal commands \emph{\PT@savewidths} and \emph{\PT@restorewidths}. Both take an optional argument specifying a name for the column width information. Thereby, multiple sets of such information can be used simultaneously.

One important thing to consider is that the widths read from the auxiliary file must not be trusted. The user may have edited the source file before the rerun, and therefore, the values read might actually be too large (or too small, but this is less dangerous).

The way we solve this problem is to distinguish two width values per column: the trusted width, only using information from the current run, and the untrusted width, incorporating information from the \texttt{.aux} file. An untrusted width can
become (conditionally) trusted if it is reached in the computation with respect to an earlier column. (Conditionally, because its trustworthiness still depends on the earlier columns being trustworthy.) In the end, we can check whether all untrusted widths are conditionally trusted.

We write the final, the maximum widths, into the auxiliary file. We perform the write operation when we are sure that a specific set is no longer used. This is the case when we save a new set under the same name, or at the end of the document. The command \texttt{\textbackslash PT@verifywidths} takes care of this procedure. This command will also check if a rerun is necessary, and issue an appropriate warning if that should be the case.

\texttt{\textbackslash PT@setmaxwidth} First, we need a macro to help us interpreting the contents of the \texttt{.aux} file. New v0.4.1: We need to define the restored columns with the \texttt{\column} command, because otherwise we will have problems in the case that later occurrences of tables in the document that belong to the same set, but define additional columns. (Rerun warnings appear ad infinitum.) In v0.4.2: columns with width 0.0 are now always trusted.

\begin{verbatim}
\newcommand*{\PT@setmaxwidth}[3]{\ifdim#3=0pt\relax\expandafter\let\csname PT@col@#2.trusted\endcsname=\PT@true\else\expandafter\let\csname PT@col@#2.trusted\endcsname=#1\fi\column{#2}{}}
\end{verbatim}

\texttt{\textbackslash PT@loadtable} Now, we can load table information that has been read from the \texttt{.aux} file. Note that a \texttt{\csname \ldots\endcsname} construct expands to \texttt{\relax} if undefined.

\begin{verbatim}
\def{\PT@loadtable#1#2\loadtable}{\expandafter\show\csname PT@restore@\romannumeral #1\endcsname %\column
\PT@typeout@{Calling \expandafter\string \csname PT@restore@\romannumeral #1\endcsname.}%\expandafter\show\csname PT@load@\romannumeral #1\endcsname \csname PT@restore@\romannumeral #1\endcsname}
\end{verbatim}

\texttt{\textbackslash PT@loadtablebyname} Often, we want to access table information by a column width set name.

\begin{verbatim}
\def{\PT@loadtablebyname#1#2\loadtablebyname}{\expandafter\show\csname PT@restore@\romannumeral #1\endcsname %\column \PT@typeout@{Loading table information for column width set #1.}%\expandafter\show\csname PT@widths@#1\endcsname \csname PT@restore@\romannumeral #1\endcsname}
\end{verbatim}

\texttt{\textbackslash PT@saveinformation} In each table for which the widths get reused (i.e., in all tables that use either \texttt{savecolumns} or \texttt{restorecolumns}, we have to store all important information for further use.

\begin{verbatim}
\def{\PT@saveinformation#1#2\saveinformation}{\expandafter\show\csname PT@temp\endcsname %\column \PT@expanded{\def{\PT@temp}{\expandafter{\csname PT@widths@#1\endcsname}}}}
\end{verbatim}

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\PT@expanded{\def\PT@temp}{\csname PT@restore@\romannumeral\PT@temp\endcsname}}% start empty
% this is: \PT@Execute{\Map{\PT@savecolumn{\PT@temp}}{\Reverse\PT@allcols}}
\expandafter\PT@Execute\expandafter{\expandafter\Map\expandafter{\expandafter\PT@savecolumn\expandafter{\PT@temp}}{\Reverse\PT@allcols}}}

\PT@savecolumn A single column is saved by this macro.
\def\PT@savecolumn#1#2% #1 macro name, #2 column name
{\PT@typeout@{saving column #2 in \string #1 ...}%
\def\PT@temp{#2}%
\ifx\PT@temp\PT@nullcol
\PT@typeout@{skipping nullcol ...}%
\else
\PT@typeout@{max=\csname #2.max\endcsname, %
width=\csname #2.width\endcsname, %
trusted=\csname #2.trusted\endcsname}%
% we need the column command in here
\PT@gaddendmacro{#1}{\maxcolumn}%
\ifnum\csname #2.trusted\endcsname=\PT@true\relax
\PT@gaddendmacro{#1}{\PT@true}\relax
\fi
\fi}
\PT@savewidths
If we really want to save column width information, then the first thing we should
worry about is that there might already have been a set with the name in question.
Therefore, we will call \PT@verifywidths for that set. In the case that there is
no set of this name yet, we will schedule the set for verification at the end of
document.
\newcommand*{\PT@savewidths}[1][default@]{\PT@typeout@{Executing \string\savecolumns [#1].}%
\edef\PT@temp{\PT@StripColumn{#2}}%
We now reserve a new unique number for this column width set by increasing the \PT@table counter. We then associate the given name (or default@) with the counter value and restore the widths from the .aux file if they are present.

\PT@restorewidths Restoring information is quite simple. We just load all information available.

\PT@comparewidths #1 full column name

\PT@trustedmax

\PT@equalwidths #1 full column name

\PT@verifywidths #1 column width set name
Here we prepare to write maximum column widths to the .aux file.

\def\PT@save@table#1% {\PT@typeout@{Saving column width information.}% \if@filesw \PT@prelazylist \immediate\write\@auxout{% \gdef\expandafter
noexpand\csname PT@restore\romannumeral\PT@table\endcsname{\PT@Execute{\Map{\PT@write@column{#1}}{\Reverse\PT@allcols}}}}}% \PT@postlazylist \fi}

\def\PT@write@column #1#2% {\maxcolumn^^J{\PT@StripColumn{#2}}{\@nameuse{#2#1}}}%

7.8 The user environments

It remains to define the environments to be called by the user. New in v0.8: we add the environments ptboxed and pmboxed for text-mode and math-mode boxed
environments. In turn, we remove \texttt{ptabular} and \texttt{parray}, and make the point to their new counterparts.

The following assignment is a hack. If \texttt{pboxed} is called from within another \texttt{tabular}- or \texttt{array}-environment, then this sometimes does the right thing.

\begin{verbatim}
def\boxed{\let\PT@begin \empty \let\PT@end \empty
\begin{polytable}
def\ptboxed{\def\PT@begin {\tabular{@{}l@{}}}\let\PT@end \endtabular\let\PT@cr \@arraycr
\expandafter\beginpolytable
\let\endptboxed\endpolytable
\def\pmboxed{\def\PT@begin {\array{@{}l@{}}}\let\PT@end \endarray\let\PT@cr \@arraycr
\expandafter\beginpolytable
\let\endpmboxed\endpolytable
\let\ptabular \ptboxed
\let\endptabular \endptboxed
\let\parray \pmboxed
\let\endparray \endpmboxed
\end{verbatim}

That is all.

\end{verbatim}